NEWTON CROUCH

explains

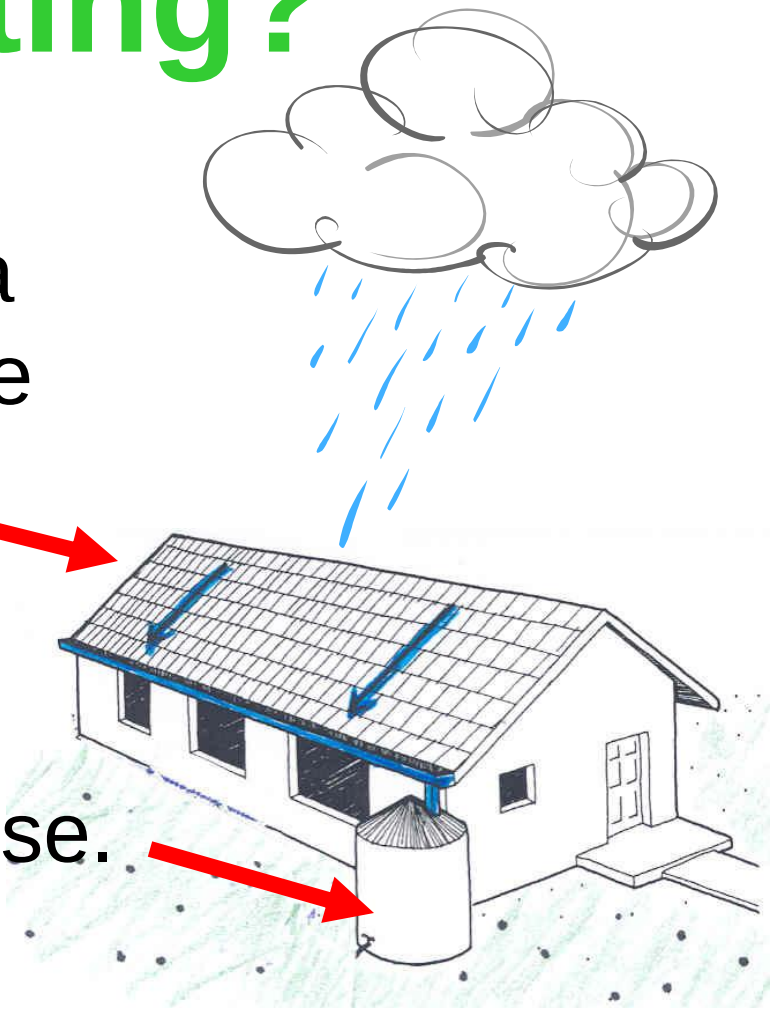
Rainwater Harvesting

A Way to Conserve Water

What is Rainwater Harvesting?

Collecting rainwater from a roof or other surface before it reaches the ground

Storing rainwater for future use.



What are benefits of Rainwater Harvesting?

- Reduces costs on your utility bill for both water and sewer expense

- Reduces flooding and erosion

- Rainwater is a clean, salt-free water for plants

- Reduces runoff into the stormwater drains

Another Benefit: Leed Certification requires 26-32 points

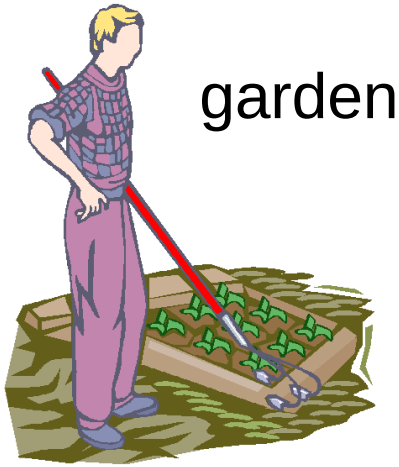
(US Green Building Council)

- Lower operating costs and increase asset value
- Reduce waste sent to landfills
- Conserve energy and water
- Be healthier and safer for occupants
- Reduce harmful greenhouse gas emissions
- Qualify for tax rebates, zoning allowances and other incentives in hundreds of cities.
- Demonstrate an owner's commitment to environmental stewardship and social responsibility

The National Green Building Standard offers the following points for rainwater collection:
801.11 Rainwater collection and distribution.
(1)Rainwater is collected and used: 6 points
(2)Rainwater is distributed using a renewable energy source or gravity: 2 points
Courtesy of NAHB 2009 (National Association of Home Builders) Pg 20 GARainWaterGdlns

How Can Rainwater Be Used?

Landscaping



gardening

greenhouses

Fire Suppression

Fountains & Pools

Livestock or kennels

Washing Equipment

Cooling Towers

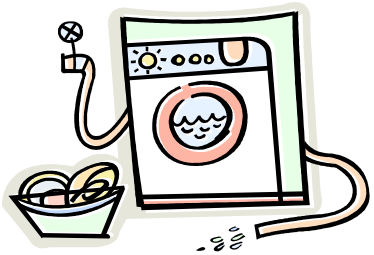
Can Rainwater Be Used as Potable Water?

Water must be treated.
Filtration and Disinfection

drinking

UV Light
Carbon Filter
Chlorination
Ozonation
Distillation
Sediment filters

bathing



washing clothes

cooking

How Much Rain Does Atlanta Receive?

Rain statistics are available on the website:

www. Georgiaweather.net

- Average rain from 1961 – 2005 was **51 INCHES PER YEAR**
- Rain for 2006 was 46.11 inches
- Rain for 2007 was 25.48 inches
- Rain for 2008 was 33.30 inches
- Rain for 2009 was 71.13 inches

Information is from the Georgia Automated Environmental Monitoring Network and the Griffin Campus of UGA in Spalding County

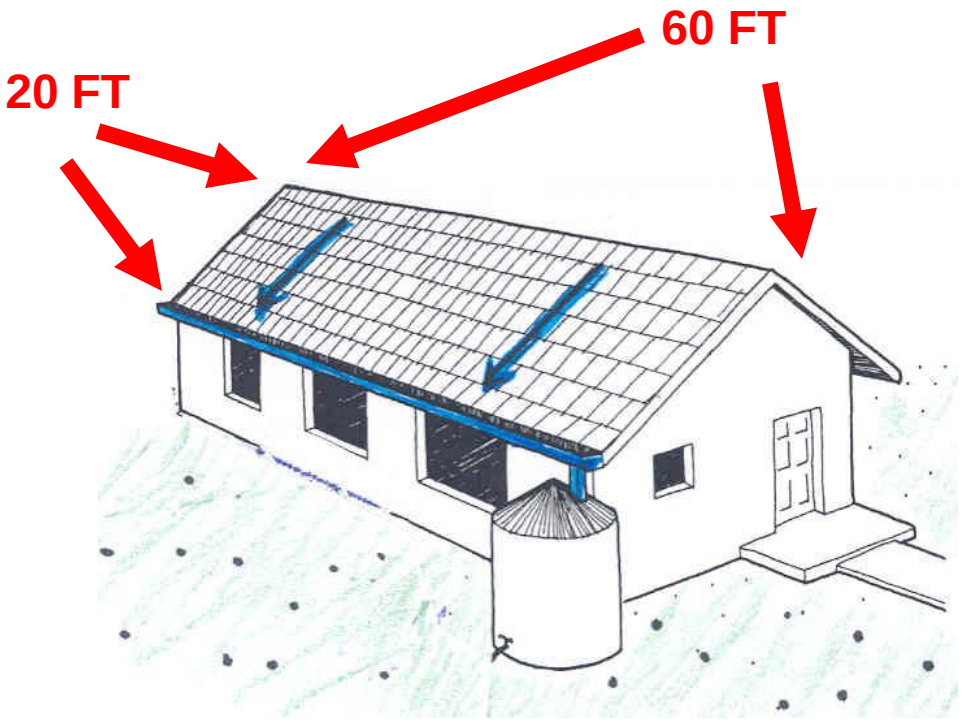
How Much Rainwater Can I Collect?

.624 gallons of water falls on each square foot of roof area in a 1 inch rain.

1,200 sq ft of roof

collects

749 gallons



How Much Rainwater Is That?

On a 1200 Sq Ft Roof

If you have a 1” rain just 2 times a month you can collect:

- 1,498 gallons in a single month
- 17,976 gallons in a year

With a 50 inch per year annual rainfall you can collect:

- 37,450 gallons per year from 1200 sq ft of roof!

That is a lot of rainwater!

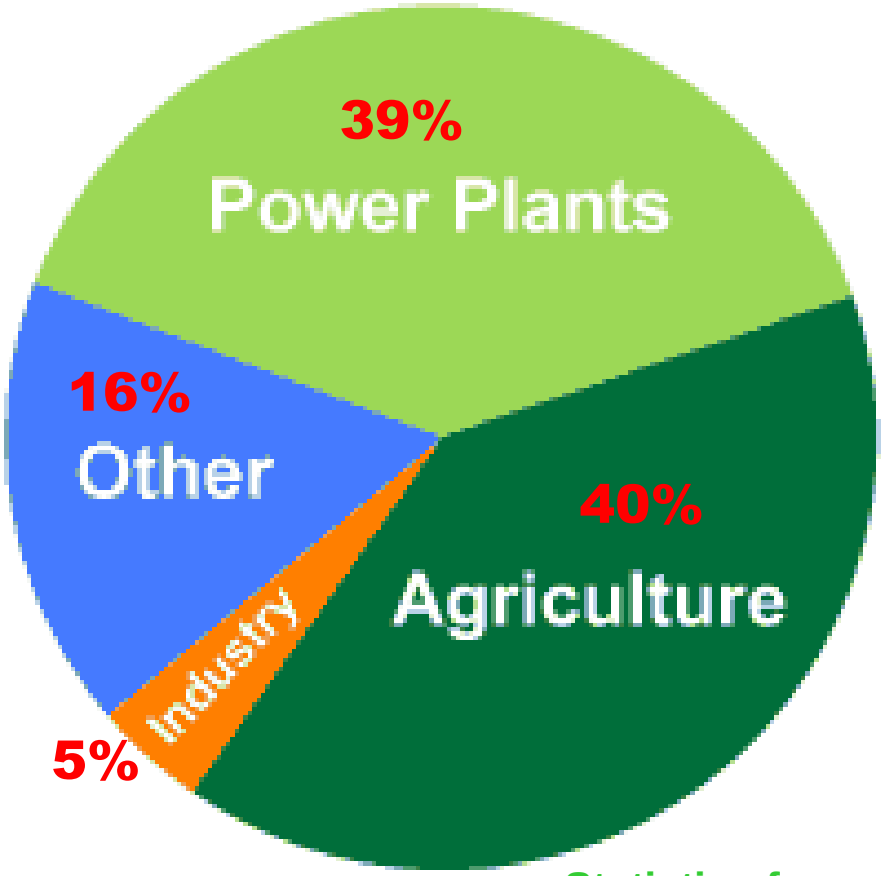
How much water do we use?

America uses
408 BILLION Gallons per Day

Other includes urban & suburban household

As much as 60% of urban and suburban water consumption is used as landscape irrigation.

And 50% of that water can be lost to evaporation and runoff.



Statistics from
H2oconserve.org

“Water is the great sleeping crisis, and it is definitely starting to wake up.”

The World’s Water is:

.5 % fresh water

97% sea water

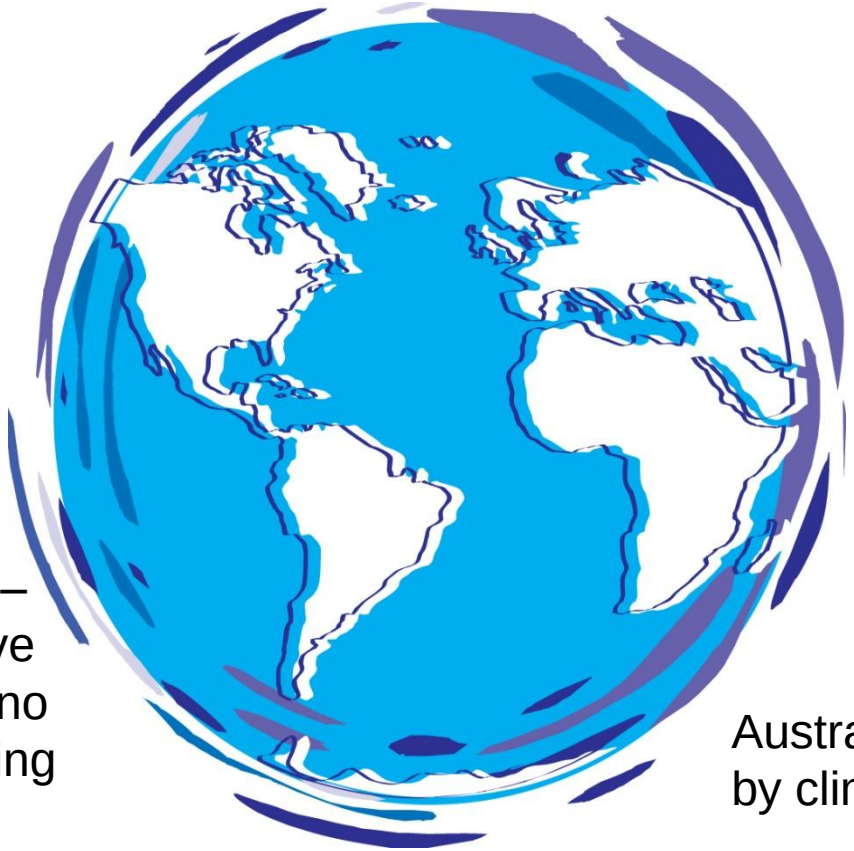
2 .5 % frozen fresh water

AG Professional Magazine Jan 2010 edition

The world population is expected to double by the year 2050.

How will all these people be fed?

Water is a limiting factor for agriculture as much as arable land



The United States – will continue to be the provider for much of the world

South America – need to preserve the rain forest, no more clear cutting

Europe – limited acreage available, many laws regulating ag

China & India – large populations, lack sophisticated methods, climate & soil limitations

Australia – limited by climate & soil

The US uses sustainable agriculture and now has to find a way to sustain agriculture through water management

Basic Components of a Non-Potable Water System

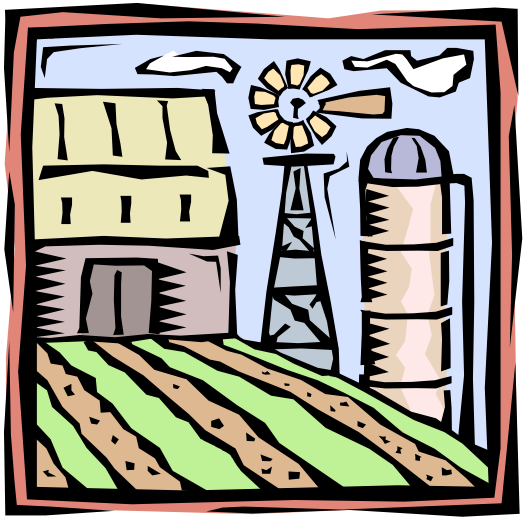
1. Catchment
2. Conveyance
3. Filtration
4. Storage
5. Distribution

Catchment Area

The surface upon which the rainwater falls:

Home

Barn



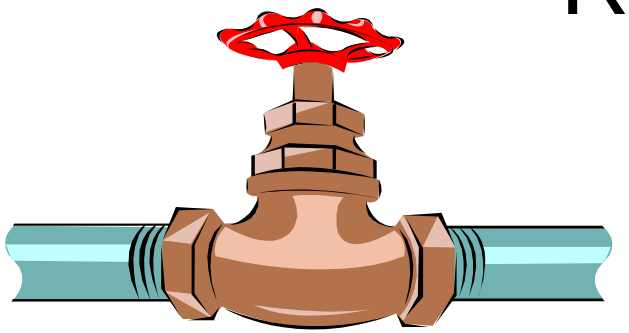
Greenhouse

Business

Conveyance

Devices that transport the rainwater from the catchment area to the storage area

- Gutters
- Pipes
- Drains
- Rain Chains



Filtration

Below Ground Installations

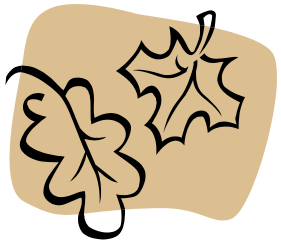
Above Ground Installations

Devices that remove pollutants or debris from rainwater as it travels from catchment area to the storage area

Why is Your Filter Important?

Bird or Animal Droppings

Insects



Leaves

Dirt, Mold, Pollen & Particles From Shingles

These don't belong in your storage!

Storage

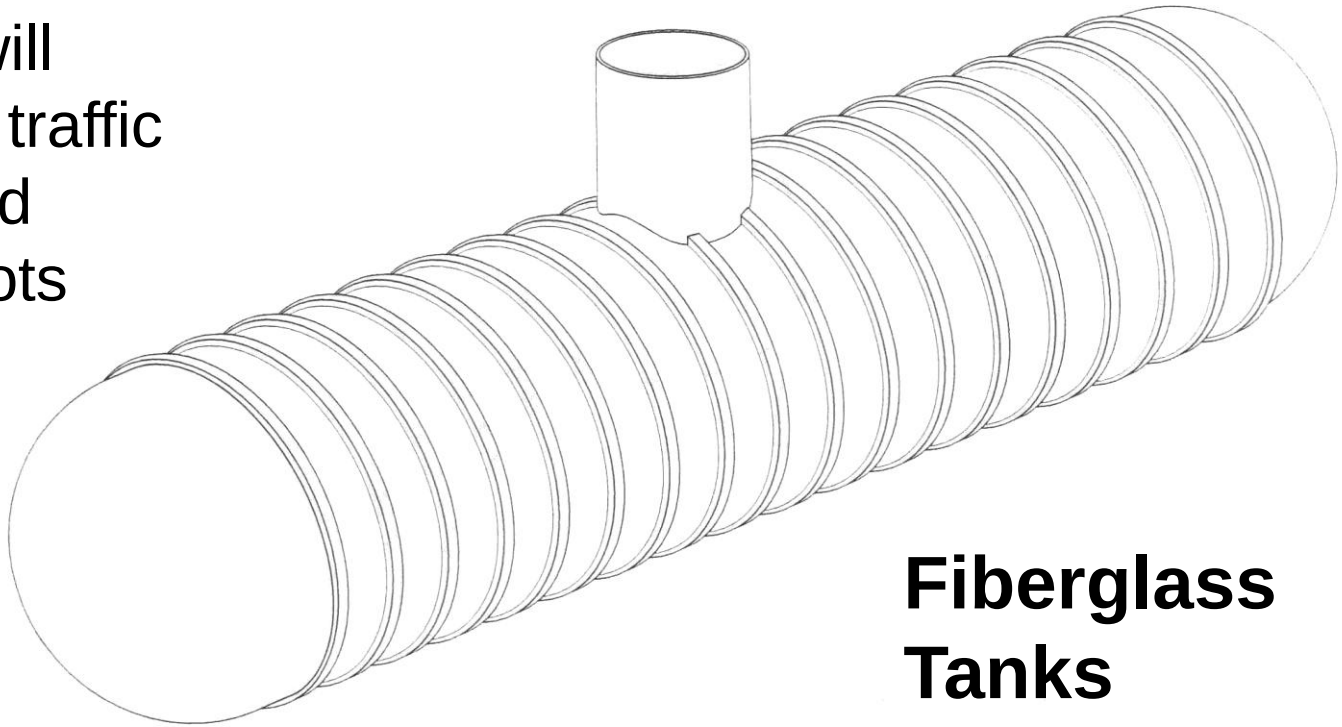
Poly Tanks are for **above ground or buried use.**

12 to 12,000 gallon capacity

Made of FDA approved resins for storage of potable water

Storage

This structure will support vehicle traffic and can be used under parking lots and roads



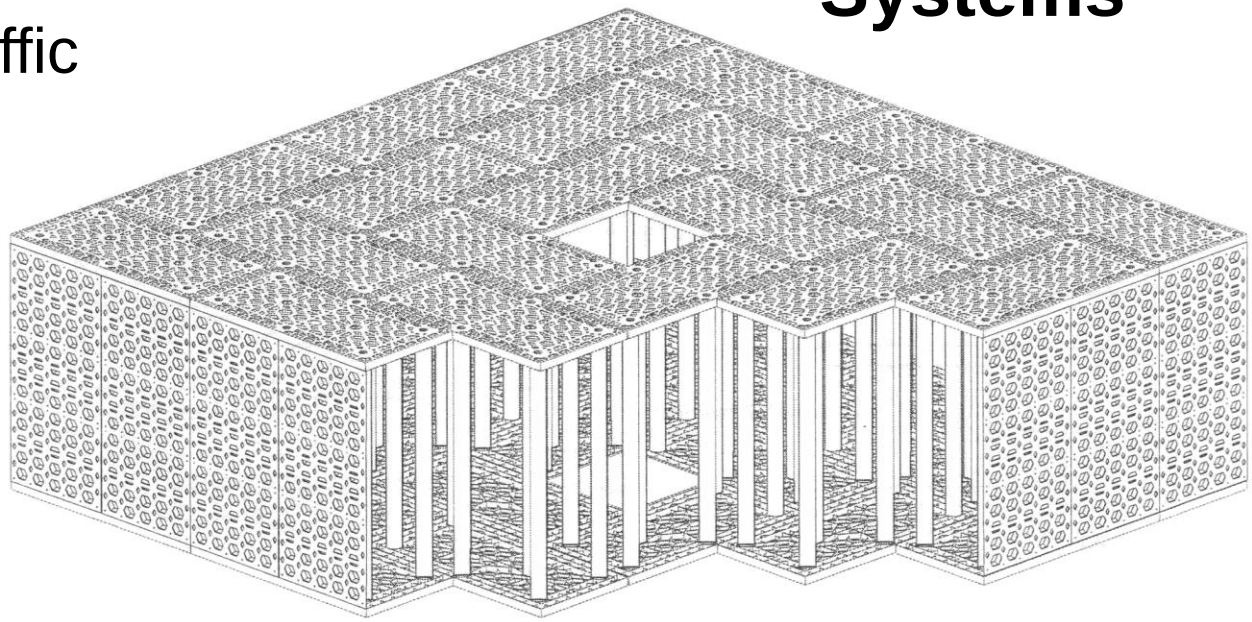
Fiberglass Tanks

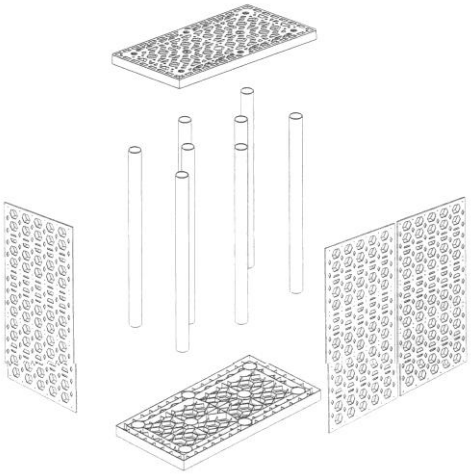
- 4,000 gallons and up
- Underground only

Storage

Modular Systems

This structure will support vehicle traffic and can be used under parking lots and roads

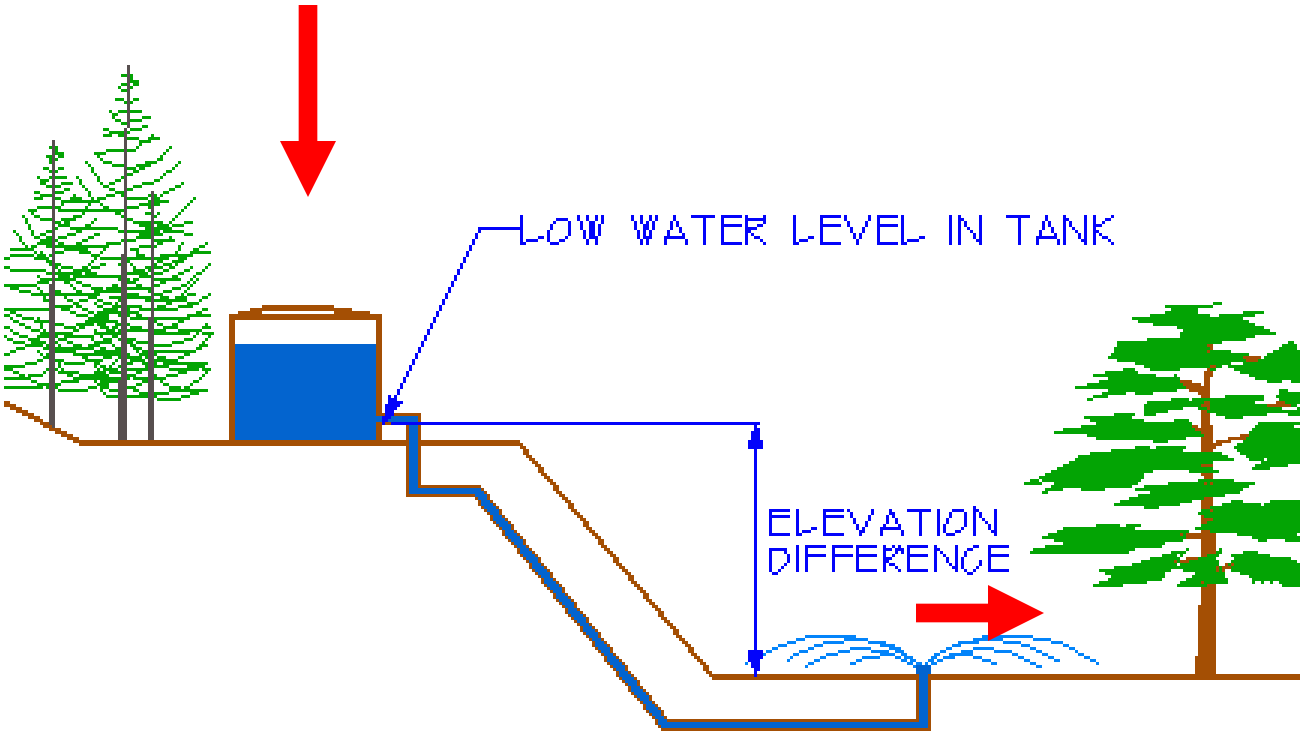




- <u>Unlimited capacity</u>
- Modular system can be configured to conform with shape of your area
- Comes with waterproofing membrane, protection fabric and access way

Distribution:
Gravity Water Pressure

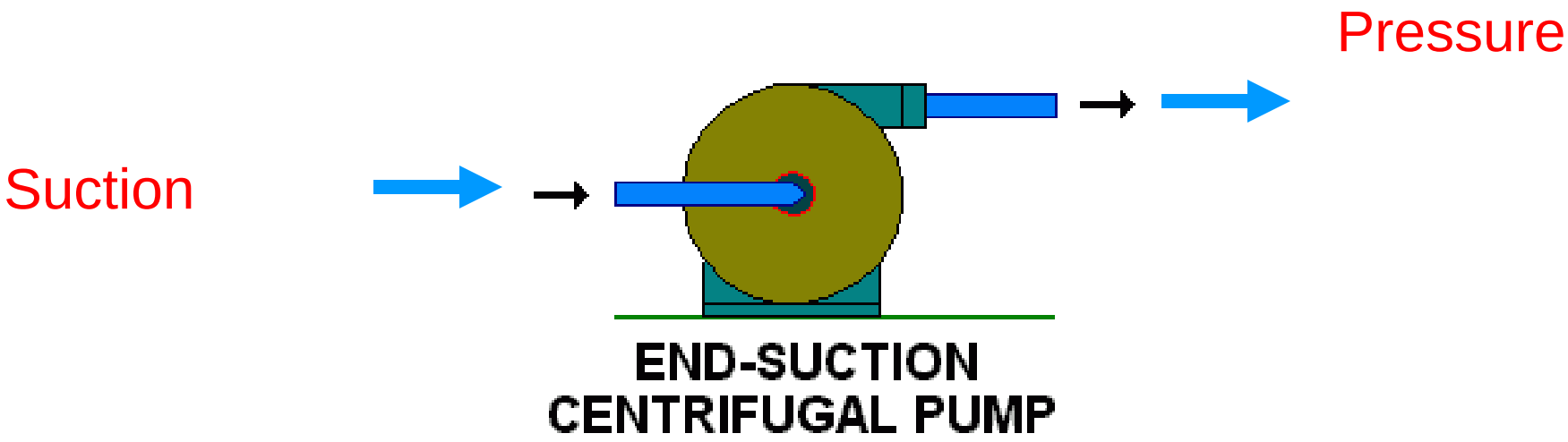
The less water in the tank The less water pressure.



TYPICAL GRAVITY FLOW WATER SYSTEM

Distribution:
Mechanical Water Pressure

The pump should be purchased AFTER you have decided how you will be using your system, i.e. using a hose, drip irrigation, etc



Where Do I Start?

Start your learning experience with
www.arcsa.org

- The ARCSA website has extensive links & publications from a variety of educational, government & commercial sources.

- The ARCSA website BUSINESS DIRECTORY has member companies from all over the US

Standards for Design and Installation

Important!!

Get References!

- **There are no standard laws from state to state.**
- **There are no standard building codes from state to state.**
- **No certification is required of installers**

ARCSA has published guidelines for rainwater harvesting systems, and is currently writing national standards for the rainwater harvesting industry, both of which are available on their website. Currently Rainwater Catchment Design and Installation Standards are being developed by a joint effort of ARCSA and the American Society of Plumbing Engineers (ASPE). The purpose of these standards is to assist engineers, designers, plumbers, builders/developers, local government, and end users in successfully implementing rainwater catchment systems. These standards will apply to new rainwater catchment installations, as well as alterations, additions, maintenance and repairs to existing systems.

Planning your system begins with the building design

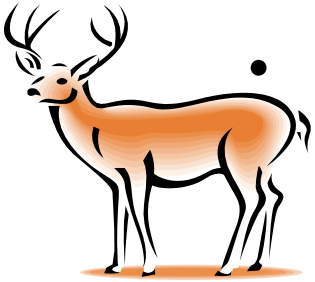
- End User
- Architect and Engineer –
  Know Building Codes, State & Local Laws
- Construction Company
- Rainwater Harvesting Expert

Plan BEFORE You Build!

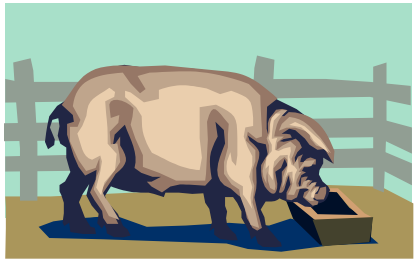
It’s easier to do it right than it is to do over!

Practical Applications of Rainwater Harvesting Systems in Use TODAY

- Crop Production



- Wildlife & Livestock



- Commercial

- Educational

- Correctional

- Residential

3000 Sq Ft Greenhouse

by Paul Cross

Charybda Farms in Arroyo Hondo, NM

12” rain annually
(30% of water arrives as snow)

Seamless gutters on greenhouse and residence

Old poly roof is spread on ground. Snow melt is funneled into tanks

Grate keeps wildlife out.

PVC pipes transport water from outside tank to inside tank using gravity feed
Inside water warms to ambient temperature before use

Tank tops are sloped for drainage. Each tank top holds 48 flats

Inside tanks 5x10x5

- 3' below ground, 2' above. Adds thermal mass when the tanks are full.
- Welded 2" angle steel, 20ga galvanized sheeting, PVC liner

Biofilms & precipitates cause most clogging

Drip irrigation 6-8 times daily

Nutrients are added for constant feed fertigation.

Lack of minerals in rainwater can lead to nutrient deficiency.

Water must be monitored for bacteria

Blossom End Rot caused by calcium deficiency.

Agricultural Field Application

by Clair Klock

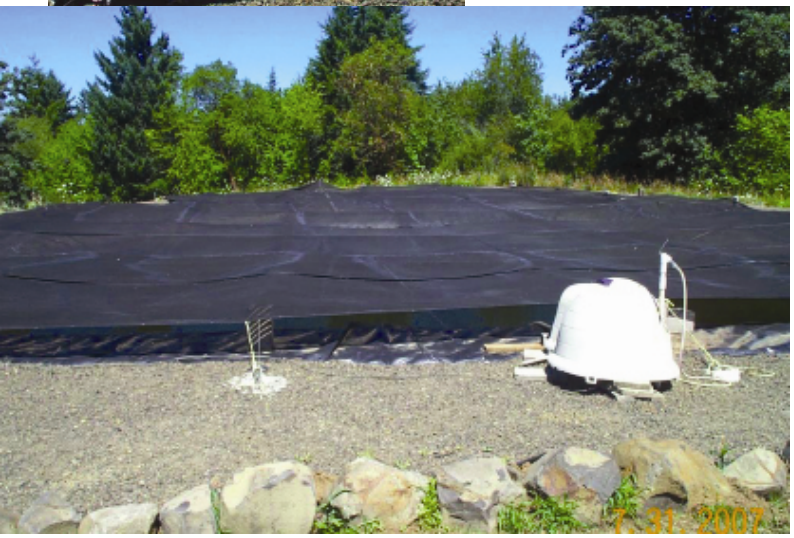
Clackamas Soil & Conservation District in Oregon City OR

Water Used for Drip Irrigation - ONLY

Rainwater is captured off the greenhouses and channeled down to ponds

Ponds are covered with water permeable cloth to help keep out debris & reduce evaporation

100,000 gallon pond



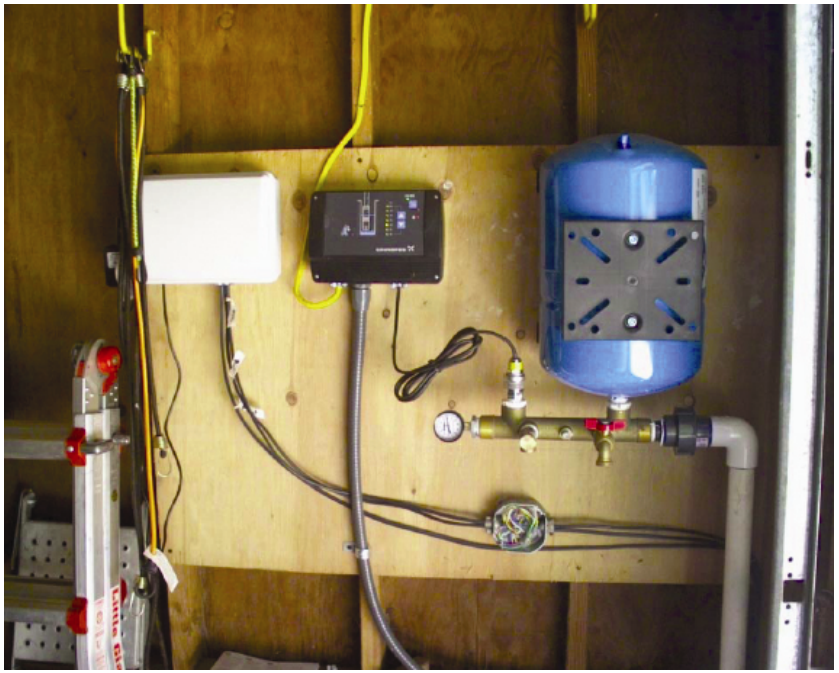
200,000 gallon pond

600,000 gallon pond

Pumps

Fertigation

Pressure Tank



Control Timer

Livestock & Wildlife Applications

by Billy Kniffen

AgriLife Extension Texas A & M System

A concrete pad funnels water into a 3,000 gallon buried tank

A gravity fed concrete trough allows wildlife to drink

Structure with metal roof catches rain and provides shade

Metal storage tank

Gravity fed trough

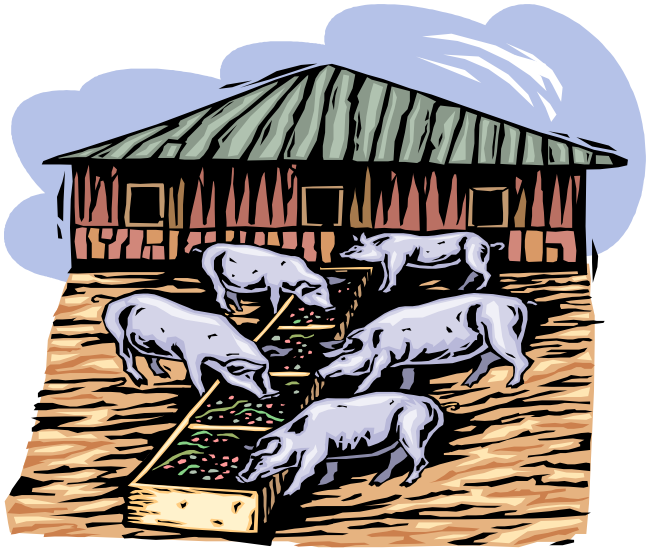
Texas State University's Freeman Ranch Wildlife Center

20' X 20' Roof + 2 – 1500 Gallon Tanks

Fence keeps livestock out and allows small wildlife to water

Swine Facility at UGA in Athens, GA

A new Swine Facility is being built in Oglethorpe County near the Athens Campus. UGA animal science professors will use it to support teaching and research in nutrition, meat quality and physiology.



This 9 barn facility will have some unique environmental features:

> **Water Conservation** - Rainwater will be captured and reused to help keep the animal buildings clean and for fire suppression.

> **Waste Handling -** The methane digester is a completely contained waste unit. Bacteria digests the waste and converts it to methane gas, but the methane gas will be reused to heat the digester and continue the process. Typically, waste is flushed out of the buildings and into a lagoon with a defined water level, where bacteria in the lagoon digest the waste. This results in offensive odor. The methane digester will eliminate that odor.

> **Air Quality**: Exhaust fans are being connected to a biofilter in order to increase air quality.

> **Fertilization**: Waste water, the liquid portion of the digested waste, which contains fertilizing nutrients, will be captured and transferred to a hay field. The hay grown on that field will be harvested and used to feed the University's animals

Turneffe Flats Fishing & Scuba Diving Resort - Belize

Turneffe Islands are a small series of islands approximately 20 miles off the coast of Belize

Each bungalow has a tank for capturing rainwater

The water from each bungalow is pumped after every rain for long-term storage

The entire bottom story of this house is actually a **70,000** gallon water storage

There is a complex series of pumps and filters

A tank farm in a secluded area holds the purified water

Valves allow water to be directed to occupied cabins only

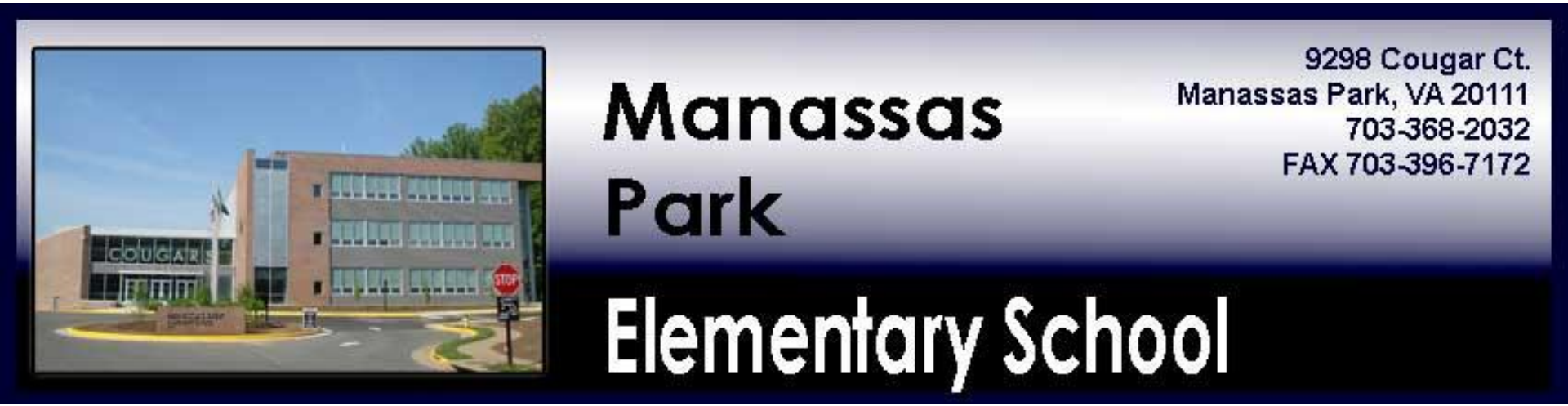
Educational Installation

Boerne-Samuel V. Champion high school opened fall 2008. A rainwater harvesting system consisting of elevated tanks and underground drains. It will gather over 4.5 million gallons from roof, air-conditioner condensation and parking lot run-off. The design & construction received the Governor's Award in May 2009 for its innovative rainwater catchment system.

Boerne, TX

Educational Installation

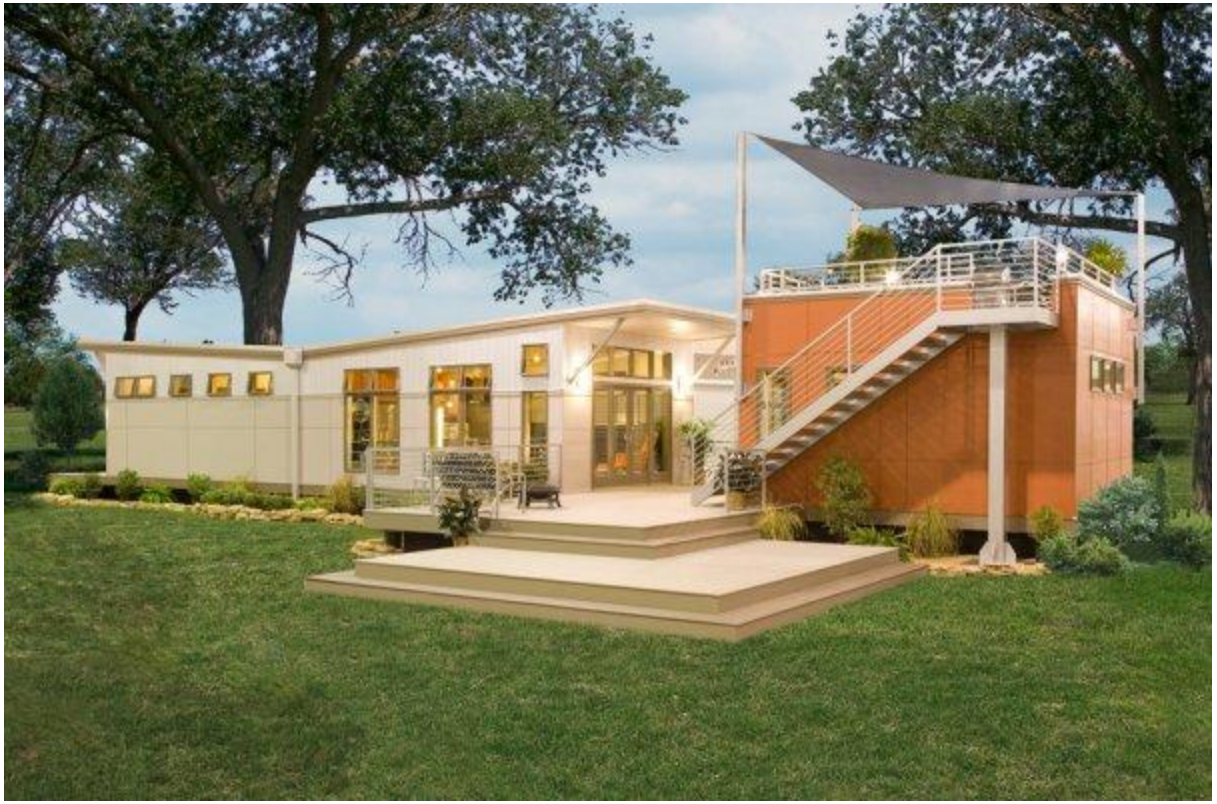
Manassas Park Elementary School has a 79,000 gallon cistern collecting rainwater. The non-potable water is used for irrigation and toilet flushing. By using RWH, the designers were able to decrease the size of retention ponds.



LEED Certified Jail

4 – 30,000 gallon fiberglass tanks provide water for the jail's laundry

Sustainable Living with the i-house™

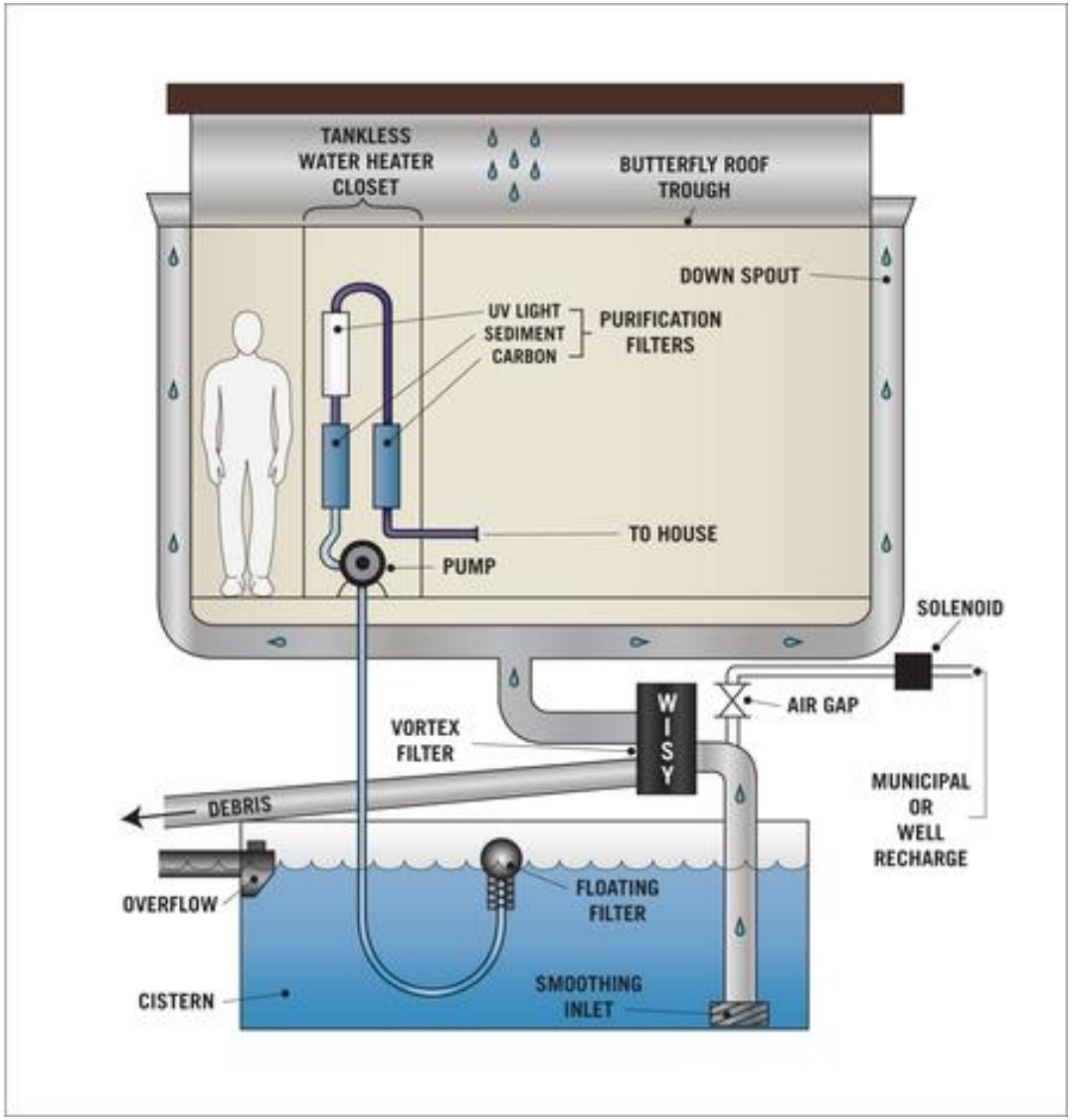


Manufactured home is designed to be self sufficient for both power and water

- Rainwater harvesting
- Solar panels

Metal butterfly roof has strategically placed gutters directing water to underground storage

Residential Potable Water i-raincatcher system™



- Collection
- Storage
- Purification

There is an i-house on display near the Clayton Justice Center on Hwy 19/41

Rain Catchers
Rainwater Harvesting Systems

Residential Installation - Atlanta, GA

A homeowner had to replace a collapsed driveway.

He decided to add a rainwater harvesting system so his wife could use the water for her 5 Koi ponds and irrigation.

Underground pipes carry water from gutters to buried tanks

She was using BOTTLED WATER to fill her ponds!

4 – 2500 Gal Tanks are buried under parking pad

Rain Catchers
Rainwater Harvesting Systems

Residential Installation - Griffin, GA

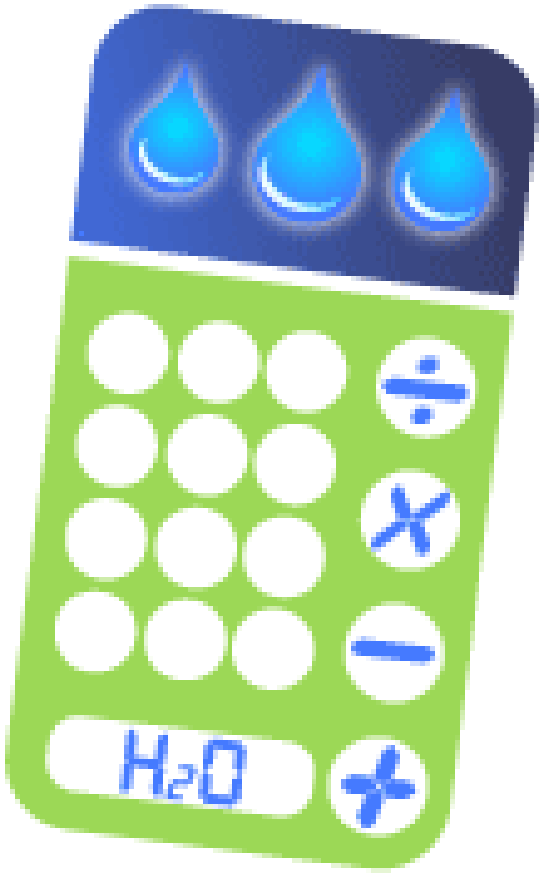
Buried water line

Dedicated Spigot

Rain Catchers
Rainwater Harvesting Systems

Calculate your Water Footprint

A calculator guides you through activities that use water in your home for a personal analysis of your water usage.



www.h2oconserve.org

We Must Learn to Conserve ALL Our Resources

Oil

Air

Rainwater Harvesting Is A Step In That Direction

Thank you for

GOING GREEN

Rainwater Harvesting

A Better Way to Water

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Certified RWH & Professional Member of ARCSA

References and Credits

- ARCSA.org website, ARCSA AP Newsletter Vol 1 Issue 1
- Georgia Rainwater Guidelines published 4.02.09
- Boerne-isd.net website
- GeorgiaWeather.net website
- H2Oconserve.org website
- ARCSA Presentation: Rainwater Harvesting Intro by Billy Kniffen
- Greenhouse by Paul Cross presented at ARCSA 2009 National Convention charybda@newmex.com
- Field crop by Clair Klock presented at ARCSA 2009 National Convention clair.klock@or.nacdnet.net
- Wildlife & Livestock by Billy Kniffen presented at ARCSA 2009 National Convention b-kniffen@tamu.edu
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